EREP MONTHLY PROGRESS REPORT - NUMBER 6

Period: September 16, 1973, to October 15, 1973

INVENTORY OF FOREST AND RANGELAND RESOURCES, INCLUDING FOREST STRESS

Registration No. 418

Contract No. T4106B

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Report Written: ~~September~~ October 16, 1973

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A. Overall Status

1. Atlanta, Georgia - forestry inventory site (512)

No SL-2 or SL-3 overflights have been accomplished over this site. We are making preparations to man this site as soon as we can determine the expected dates of SL-4 overpasses.

2. Black Hills, South Dakota - forest stress site (312)

A great deal of manpower and funds were expended preparing this site (312) for an expected SL-3 pass on displaced GT-59. As indicated in our last monthly report (No. 5), no SL-3 data were taken on September 13 because of overcast conditions. However, Weber and Waite remained on the site until September 18, the date of the next overpass, with the expectation that EREP data would be collected. The weather forecast was predicted good for that day over the site and at the time of the overpass the site was clear of clouds. A chronology of our activities and telephone communications associated with preparation of the forest stress site (312) is listed below:

Date	Work activity and communications with PIMO and ERAP personnel
8-5	New instrumentation cable was dropped off in the Black Hills by Heller and Weber on a flight from Berkeley to Bremen, Georgia, via Jackson, Wyoming, and Spearfish, South Dakota.
8-7	Data collection platforms (DCP's), DCP antennas (3), RS-2M spectrometers (5), test equipment, and associated power and instrumentation data cables were transported to the Black Hills test site from the Atlanta test site by Forest Service aircraft.

Date	Work activity and communications with PIMO and ERAP personnel
	Spectrometer and DCP battery power packs which were shipped to the Black Hills via commercial air carrier were packed up at the Rapid City Airport and transported to the field site. (Heller, Weber, Waite)
8-8/ 8-11	Initial installation of field instrumentation at the test site. DCP transmitter and antenna installation and hookup. Installation of pasture and rock site spectrometers. Installation of some cabling. Final work on the construction and test of the linear voltage taper current battery chargers (2 units with a total 12 battery charging capacity).
8-11/ 8-19	Three RS-2M spectrometers and all light-activated switches are transported back to the Berkeley headquarters for modifications, repair, and recalibration.
8-20/ 8-27/	Acquiring 1:32,000 scale color infrared aerial photographs and silicon and vidicon recording of the Black Hills EREP test site. One day spent at the field site by Dana, Myhre, Heller, and Weber on the continuing preparations for SL-3 overflight. Return to Berkeley headquarters.
8-28/ 9-6	Final test and calibration of the RS-2M spectrometers and the light-activated switches at Berkeley.
9-7	Weber and field assistant fly to the Black Hills carrying spectrometers, light switches, data acquisition equipment, new cabling and associated test and calibration equipment.
9-8	Activities -- WEBER and ASSISTANT Battery charging, Vidar hookup, RS-2M-3 checkout Calls -- Hraybal, C-130 coordination
9-9	Activities -- WEBER and ASSISTANT Battery charging, Eppley installation, Vidar hookup, and RS-2M-4 checkout. Calls -- JSC/summary telrecorder (state of readiness message recorded)
9-10	Activities -- WEBER and ASSISTANT Battery charging, Vidar hookup, DCP transmitter check, pick up Waite at the Rapid City Airport Calls -- JSC/summary telrecorder (check)

Date	Work activity and communications with PIMO and ERAP personnel
9-11	Activities -- WEBER, WAITE, and ASSISTANT Finish battery charging, spectrometer installations, DCP hookups, cabling installation, Vidar hookup. Calls -- JSC/summary telrecorder (state of readiness message recorded), JSC/Hraybal for C-130 coordination.
9-12	Activities -- WEBER, WAITE, and ASSISTANT Power pack hookup, light switch checkout and hookup, Vidar digital data acquisition test, Gill annemometer repair and hookup, Atkins dew point sensor hookup and calibration. Calls -- JSC/EREP details recorder, JSC/Hraybal for C-130 coordination, Edwards AFB for attempted contact with Reeves for RB-57 coordination.
9-13	Activities -- WEBER, WAITE, and ASSISTANT Instrumentation maintenance, data recording, and observation. Weather from 1 hour prior to pass time until 2 hours after pass time went from 75 percent broken clouds to solid overcast. Visual observation indicated the chance of scattered to broken clouds beyond 30 miles northwest of the test site. Calls -- JSC/EREP post pass recorder (actual weather conditions at pass time were recorded with request for contact from task/site coordinator), Principal Investigator (Heller) for discussion of past events and future strategy.
9-14	Activities -- WEBER, WAITE, and ASSISTANT Generator maintenance, instrumentation check, Vidar test, Waite returns to Berkeley headquarters. Calls -- JSC/summary telrecorder, JSC/Greenberg
9-15	Activities -- WEBER and ASSISTANT Generator repair, search for generator parts, light switch modification. Calls -- Edwards AFB/Reeves for coordination of RB-57 flight. Reeves agrees to fly one new 15 nm line north to south over the Bearlodge Mtn's in Wyoming. Flight line coordinates provided. JSC/Hraybal for C-130 coordination. Hraybal agrees to try to fly one short flight line over west side of Warren Peak in the Bearlodge Mtn's. JSC/summary telrecorder (state of readiness message recorded).
9-16	Activities -- WEBER and ASSISTANT Vidar test tape, recalibration of peripheral environmental instrument, field laboratory cleanup.

Date	Work activity and communications with PIMO and ERAP personnel
	Calls -- Edwards AFB/Reeves for RB-57 coordination, JSC/Hraybal for C-130 coordination, JSC/summary telrecorder.
9-17	Activities -- WEBER and ASSISTANT Instrumentation maintenance and checkout on Vidar after the previous two days of snowstorm, data recording begun for C-130 flight, observation and photography during C-130 flight. Ideal weather conditions.
	Calls -- JSC/EREP details recorder, JSC/SST room (no contact) JSC/PIMO office (No contact). These calls were made in the evening for a final briefing at which time it was learned (for the first time) that Rev 1834 track 59 was not "up" for the next day. Previous positive contact had been early morning when Clayton Forbes confirmed that Rev 1834 track 59 was scheduled as a prime data pass for the following day. Edwards AFB/returning Reeves call for coordination of RB-57 flight. Hraybal - attempted contact in Houston, Denver, and Fargo.
9-18	Activities -- WEBER and ASSISTANT A large part of the morning was spent on the telephone trying to confirm the SKYLAB pass for the day and/or trying to convince NASA officials of the need, desirability, and requirement for the flight for completion of SKYLAB experiment. Also, confirming the excellent prospects for ideal weather conditions.
	Field activities included data recording, observation, and photography under the assumption that there would in fact be a SKYLAB PASS and data take.
	Calls -- At least five personal contact calls were made to JSC after an initial early morning call to the detailed recorder which did not indicate a data take on Rev 1834 Track 59.
	Two calls were made to Greenberg who was manning the SST room phone. One call was made to Clayton Forbes in the PIMO office. Clayton could not shed much light on the current status and could offer no direct assistance. Finally, contact was made with Kirby in the PIMO office and he offered his condolences but no assistance in attempting to get the data take rescheduled. After a long plea that the weather and forest conditions were absolutely ideal for a data take with

Date	Work activity and communications with PIMO and ERAP personnel

extremely good prospects of being able to accomplish our mission goals, he indicated he could not alter the planned EREP schedule for that day. He suggested that data be collected with the hope of a good ERTS pass on the 20th of September. He was told that the prospects for good weather in the Hills, on the 20th, were not good. A final call was made to the Berkeley headquarters for discussion of strategy with the acting Principal Investigator.

After completion of data recording for the EREP fly by, the test site and recording equipment was put into a standby mode. Thus, three DCP's continued to transmit radiance and irradiance data from three spectrometers. Other equipment was turned off.

WEBER and ASSISTANT flew back to the Berkeley headquarters. Enroute, two hours were spent surveying and photographing bark beetle infestations in the Bearlodge Mtn's of Wyoming. Considerable activity in terms of dead ponderosa pine was detected and recorded. This data may be of some use in the event it is learned that the weather was clear in that area for the EREP pass on September 13 when the Black Hills test site was clouded in.

We are dismayed and discouraged that the effort that we have expended on this site has resulted in no collection of satellite data during the period of maximum radiance differences.

We shall analyze the overflight photographs taken in June on displaced GT-19. Some preliminary interpretations were given over the telephone to Clayton Forbes during this period. The two telephone conversations between Forbes and Weber on October 4 and 9 are documented below:

Date	Work activity and communications with PIMO and ERAP personnel
10-4	Clayton Forbes called from JSC/PIMO office with a request to discuss a cursory analysis of SL-2 imagery of the Black Hills test site acquired June 9, 1973. The focus of the discussion was on the 5 x 5-inch-high resolution color film, frame 157 from the S-190B terrain mapping camera.

Clayton stated at the outset that this preliminary information was needed to establish successes in the earth resource mission

Date	Work activity and communications with PIMO and ERAP personnel

on SL-2 for a program being put together for television by Jules Bergman, the NBC science editor. Secondarily, the PIMO office needed the information for a written briefing of the SL-4 astronauts.

We discussed our very preliminary successes in identifying mountain pine beetle-killed ponderosa pine. We discussed the problems with trying to detect discolored pine foliage on dead trees in June, when in fact the previous September would have been the ideal time. Further, that we felt the June imagery was very nice to have for helping us become experienced in working with SKYLAB/EREP data, but that there was no thought of accomplishing our proposed analysis on June imagery.

Using a light table and a hand lens magnifier we progressed around the photo talking about ecosystem components and especially obvious biological and geological phenomena. We worked very hard at finding beetle-killed infestation spots, and although they were very obvious to me, Clayton had a difficult time recognizing them. I suggested that he spend some time studying the frame in a rear projection viewer and on a light table with a Baush and Lomb-type microscope after I had located the infestations for him. We spent about one hour on the phone.

10-9 I checked back with Clayton Forbes to see how he was coming with the interpretation of the SL-2, S-190B image. He indicated he was doing well in some areas but was still in doubt about the beetle infestations. I suggested that we jointly get set up with our corresponding frames on a light table and a zoom microscope. He called me back when he was set up. Again, we proceeded around the northern Black Hills test site looking at infestations. Once he located the first group kill he had little trouble finding other infestations as we talked about them. We identified several known infestations (which I was jointly viewing on 1:32,000 CIR) along the Maitland powerline which had 30 or fewer trees per group. He concurred that there was no doubt what we were seeing, and agreed that once an interpreter knew what he was looking for, there was little difficulty in finding many infestations.

Date	Work activity and communications with PIMO and ERAP personnel
10-9	Together with David Faulkner, Clayton and I talked at length about many other Black Hills ecosystem components including the tornado area, half-a-dozen burn areas of varying stages of regeneration and land use. They were interested in seeing the various type rock outcroppings, the gravel quarries, and the gold mine tailings. We also had some discussion of the Rapid City flood area, part of which is apparent on the SL-2 frame. This phone conversation continued well beyond one hour.

We have requested Mr. Kirby to schedule the Black Hills site for SL-4. Mr. Kirby acknowledged that he would. In the event the area is clear of clouds and free of snow, we may be able to fulfill the objectives of the experiment if good EREP data are obtained.

3. Manitou, Colorado - range inventory site (313)

Mr. Kirby was in Fort Collins on a preanalysis visit. At that time it was firmly established that the only usable data from SL-2 over site 313 was S190A multiband photography, and we have this data. It was also confirmed that "all sensors" for S190A, S190B, S191, and S192 for our SL-3 data-take pass (August 4, 1973) were operating. The quality of this data is yet to be evaluated since it has not been received from JSC.

All but one roll of the photographic products from SL-3 aircraft support MX248 has been received but has not yet been completely indexed. Large-scale (1:5,000 and 1:600) photographs, taken by Forest Service, our own aircraft, of four selected subsites within site 313 are now indexed. We are in the process of relating ground measurements for plant foliar cover, bare-soil surface, and plant litter to the large-scale photographs in preparation of development of preliminary multistage sampling procedures to quantify specific scene images in the EREP data.

As soon as we receive our SL-3 photographic products, we will be in position to make preliminary statements relevant to the use of these kinds of data for range resources analyses.

B. Recommendations Concerning Decisions Required to Ensure Attainment of Experiment's Scientific Objectives

We will be unable to fulfill our experimental objectives for the forest stress (312) and forest inventory (512) sites unless we can obtain EREP and ERAP correlative data. To date no NASA correlative data have been obtained over these sites, except for the data we have collected with ground radiance instruments and aerial and ground photographs taken at both sites by Forest Service personnel.

For site 313, until R. S. Driscoll has the opportunity to examine SL-3 products to make comparisons with SL-2 products, we have no specific recommendations for plant community classification.

As soon as the SL-4 orbital information is known for GT-43 (over the forest inventory site - 512) and GT-2 (over the forest stress site - 312), we request that we be notified so that we can establish our field schedule.

C. Expected Accomplishments

Preliminary indications are that S190A and S190B show that some large infestations can be detected on this imagery over our stress site (312). A quantitative analysis will be made to show the minimum target size that can be reliably detected.

On our rangeland site (313), we should be able to make preliminary statements of relationships between amounts of plant foliar cover, a parameter used to establish relative values for range site quality and productivity, and ERAP image characteristics. This involves establishing regression estimates between ground and photometric measurements.

D. Significant Results, Practical Applications, and Operational Problems

We are unable to identify significant results because of no EREP data over two of our sites. The operational problems concern the collection of satellite data when good weather occurs.

E. Summary Outlook

No changes in our statement until we determine whether we can get satisfactory EREP data on SL-4.

F. Travel Plans - October 16 to November 15, 1973

No plans for travel until after November 15, 1973.